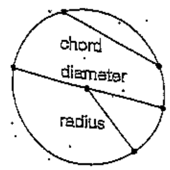
9-1 Study Guide

DATE ________

Exploring Circles

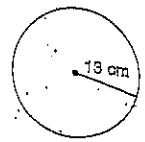


A **circle** is the set of all points in a plane that are a given distance from a given point in the plane called the **center**. Various parts of a circle are labeled in the figure at the right.

The distance around a circle is called the **circumference**.

Circumference of a Circle	If a circle has a circumference of C units and a radius of r units, then $C = 2\pi r$.

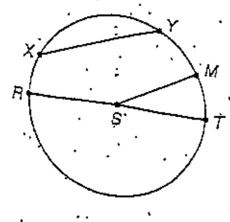
Example: Find the circumference of the circle shown at the right.



$C = 2\pi r$
$C = 2\pi(13)$
$C = 26\pi$
$C \approx 81.7$

The circumference is about 81.7 cm.

Refer to ⊙S for Exercises 1–6.



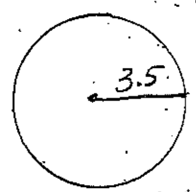
1. Name the center of ⊙S. S
2. Name three radii of ⊙S. $\overline{SM}, \overline{ST}, \overline{SR}$
3. Name a diameter. $\overline{RT}$
4. Name a chord. $\overline{XY}$ n $\overline{RT}$
5. If $RT = 8.2$, find SM. 4.1
6. Is $\overline{SR} \cong \overline{SM}$? Explain. yes both radii

In Exercises 7–10, the radius, diameter, or circumference of a circle is given. Find the other measures to the nearest tenth.

7. $r = 7$, $d = ?$, $C = ?$ d=14 C=44
8. $d = 32.4$, $r = ?$, $C = ?$ 16.2, 101.8
9. $C = 116.5$, $d = ?$, $r = ?$ 37.1, 18.6
10. $r = 12$, $d = ?$, $C = ?$ 24, 75.4

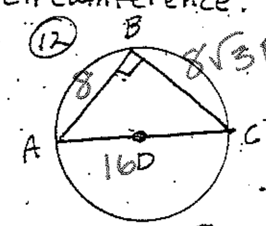
Find the exact circumference.

(11)



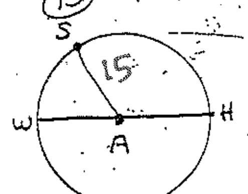
C = ?7π

(12)



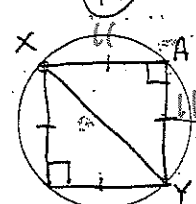
radius = 8
AB = 8 BC = ?
8√3π

(13)



SA = 15
AH = 15
C = ?
30π

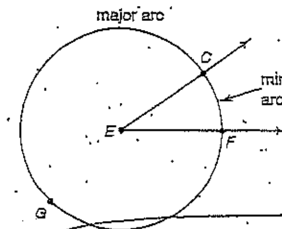
(14)



AY = 11
XY = ? 11√2

Study Guide 9.2

Angles and Arcs

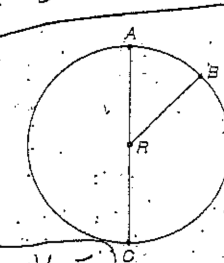


An angle whose vertex is at the center of a circle is called a **central angle**. A central angle separates a circle into two arcs called a **major arc** and a **minor arc**. In the circle at the right, $\angle CEF$ is a central angle. Points C and F and all points of the circle interior to $\angle CEF$ form a minor arc called arc CF. This is written $\overset{\frown}{CF}$. Points C and F and all points of the circle exterior to $\angle CEF$ form a major arc called $\overset{\frown}{CGF}$.

area of sector
$\frac{CA}{360} \cdot \pi r^2$

You can use central angles to find both the degree measure and the length of an arc. The arcs determined by a diameter are called semicircles and have measures of 180.

Examples: In ⊙R, $m\angle ARB = 42$, $RB = 12$, and $\overline{AC}$ is a diameter.



1 Find $m\overset{\frown}{AB}$ and $m\overset{\frown}{ACB}$.
Since $\angle ARB$ is a central angle and $m\angle ARB = 42$, then $m\overset{\frown}{AB} = 42$.
$m\overset{\frown}{ACB} = 360 - m\overset{\frown}{AB} = 360 - 42$ or 318

2 Find the length of $\overset{\frown}{AB}$.
First, find what part of the circle is represented by $\angle ARB$.

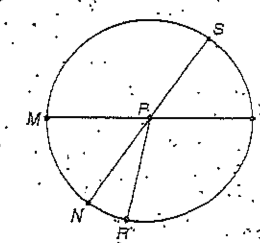
$\frac{42}{360} = \frac{7}{60}$

So, the length of $\overset{\frown}{AB}$ is $\frac{7}{60}$ of the circumference of ⊙R.

length of $\overset{\frown}{AB} = \frac{7}{60}(2\pi r)$
$= \frac{7}{60}(2\pi)(12)$ or about 8.8 units

arc length =
$\frac{CA}{360} \cdot \pi d$

Refer to ⊙P for Exercises 1–8. If $\overline{SN}$ and $\overline{MT}$ are diameters with $m\angle SPT = 51$ and $m\angle NPR = 29$, determine whether each arc is a minor arc, a major arc, or a semicircle. Then find the degree measure of each arc.



1. $m\overset{\frown}{NR}$ minor, 29°
2. $m\overset{\frown}{ST}$ minor, 51
3. $m\overset{\frown}{TSR}$ major 260°
4. $m\overset{\frown}{MST}$ 180°

If $MT = 15$, find the length of each arc. Round to the nearest tenth.

5. $\overset{\frown}{NR}$ 3.8
6. $\overset{\frown}{ST}$ 6.7
7. $\overset{\frown}{TSR}$ 34
8. $\overset{\frown}{MST}$ 23.6

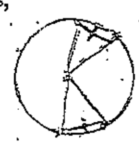
(9) Find the area of the sector contained ∠NPR

$\frac{29}{360} \cdot \pi (7.5)^2$

14.2

Arcs and Chords

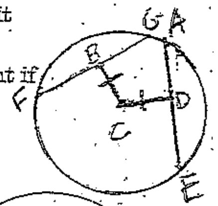
The following theorems state relationships between arcs, chords, and diameters.



- In a circle or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.
- In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.
- In a circle or in congruent circles, two chords are congruent if and only if they are equidistant from the center.

ch

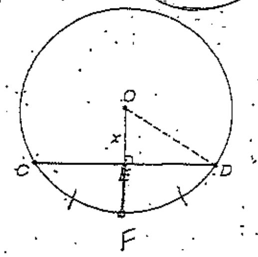
Ca



Example: In the circle, O is the center, $OD = 15$, and $CD = 24$. Find x.

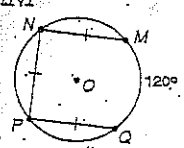
$$ED = \frac{1}{2}CD$$
$$= \frac{1}{2}(24)$$
$$= 12$$

$$(OE)^2 + (ED)^2 = (OD)^2$$
$$x^2 + 12^2 = 15^2$$
$$x^2 + 144 = 225$$
$$x^2 = 81$$
$$x = 9$$



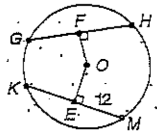
In each circle, O is the center. Find each measure.

1. $m\widehat{NP}$



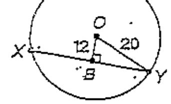
80°

2. KM



24

3. XY



32

4. Suppose a chord is 20 inches long and is 24 inches from the center of the circle. Find the length of the radius.

26

5. Suppose a chord of a circle is 5 inches from the center and is 24 inches long. Find the length of the radius.

13

6. Suppose the diameter of a circle is 30 centimeters long and a chord is 24 centimeters long. Find the distance between the chord and the center of the circle.

9

NAME ____________ DATE ____________

9-4 Study Guide

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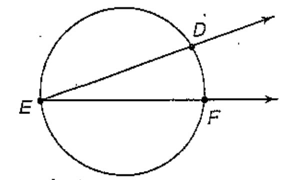
Inscribed Angles

An **inscribed angle** of a circle is an angle whose vertex is on the circle and whose sides contain chords of the circle. We say that $\angle DEF$ *intercepts* $\widehat{DF}$. The following theorems involve inscribed angles.



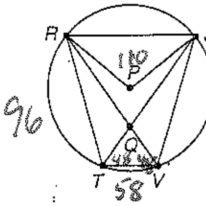
- If an angle is inscribed in a circle, then the measure of the angle equals one-half the measure of its intercepted arc.
- If two inscribed angles of a circle or congruent circles intercept congruent arcs or the same arc, then the angles are congruent.
- If an inscribed angle of a circle intercepts a semicircle, then the angle is a right angle.
- If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

Example: In the circle above, find $m\angle DEF$ if $m\widehat{DF} = 28$. Since $\angle DEF$ is an inscribed angle, $m\angle DEF = \frac{1}{2}m\widehat{DF} = \frac{1}{2}(28)$ or 14.

110
96
96
302

360
−302
58

In ⊙P,



1. Name the intercepted arc for $\angle RTS$. $\widehat{RS}$

2. Name an inscribed angle. ∠RVS . . . .

3. Name a central angle. ∠RPS

In ⊙P, $m\widehat{SV}$ = 96 and $m\angle RPS$ = 110. Find each measure. also m∠RVT = 48°

4. $m\angle$ RVS 55

5. $m\widehat{RS}$ 110

6. $m\angle RTS$ 55

7. $m\widehat{TV}$ 58°

8. $m\widehat{RV}$ 154°

96
58
154

9. m ∠TQV 84°

48
×2
96

180
−96
84